What is claimed is:

1. A device, comprising:

a superconductor flux pump with a transformer, the transformer including, on a secondary side, at least one superconducting coil in a rectifier circuit and at least two controllable switches; and

a superconducting coil of an electromagnet, wherein the pump feeds current into the superconducting coil, wherein the respective secondary-side coil includes HT_c superconductor material and wherein MOSFETs are provided as the at least two controllable switches in the secondary-side rectifier circuit.

2. The device as claimed in claim 1, wherein the flux pump and the superconducting coil of the electromagnet are arranged together in a common vacuum chamber of a cryostat.

3. The device as claimed in claim 1, wherein, for a respective individual switch, a plurality of MOSFETs are electrically connected in parallel with one another.

4. The device as claimed in claim 1, wherein the MOSFETs are selected, with respect to their electrical forward resistance at a relatively low operating temperature, such that MOSFETs with a relatively low forward resistance are provided in the rectifier circuit.

5. The device as claimed in claim 1, wherein the MOSFETs are arranged on a base plate of a relatively highly thermally conducting material.

6. The device as claimed in claim 5, wherein the base plate includes an electric heater to control temperature of the base plate.

7. The device as claimed in claim 5, wherein the base plate includes a temperature sensor for use in a temperature control loop, for use in controlling operating temperature of the MOSFETs.

8. The device as claimed in claim 5, wherein the base plate is connected by mechanical connections with a thermally conductive property, to a heat sink.

9. The device as claimed in claim 8, wherein the heat sink includes a platform.

10. The device as claimed in claim 8 , wherein a number and dimensioning of the mechanical connections are selected such that electrical power loss generated in the MOSFET elements of the switches and heat output from a heater, which may be provided, are in time equilibrium with an amount of heat flowing away through the mechanical connections into the platform of the heat sink.

11. The device as claimed in claim 8, wherein the mechanical connections, provided between the base plate of the switches with the MOSFETs and the heat sink, are dimensioned with regard to the their heat dissipations, such that during operation of the device, their heat-dissipating effect is able to reach approximately 1.5 to approximately 3 times a sum of Joulian heat produced in the MOSFETs.

12. The device as claimed in claim 1, wherein the transformer includes a ferrite core.

13. The device as claimed in claim 1, wherein the transformer includes no core.

14. A method of operating a device as claimed in claim 1, comprising feeding the transformer of the flux pump with current pulses.

15. The method of claim 14, wherein the feed is designed in a frequency band from main frequency up to MHz.

16. The method of claim 14, wherein current stabilization in the electromagnet is implemented by regulating frequency of the pulses of the feed to the transformer of the flux pump.

17. The method of claim 14, wherein current stabilization in the electromagnet is implemented by regulating primary-side current amplitude of the transformer of the flux pump.

18. The method of claim 14, a predefined constant temperature is maintained for the MOSFETs of the switches.

19. The method of operating a device as claimed in claim 14, wherein by regulating the heater, a predefined temperature of the base plate with respect to the lower operating temperature of the coil of the electromagnet is maintained.

20. The device as claimed in claim 2, wherein, for a respective individual switch, a plurality of MOSFETs are electrically connected in parallel with one another.

21. The device as claimed in claim 2, wherein the MOSFETs are selected, with respect to their electrical forward resistance at a relatively low operating temperature, such that MOSFETs with a relatively low forward resistance are provided in the rectifier circuit.

22. The device as claimed in claim 3, wherein the MOSFETs are selected, with respect to their electrical forward resistance at a relatively low operating temperature, such that MOSFETs with a relatively low forward resistance are provided in the rectifier circuit.

23. The device as claimed in claim 6, wherein the base plate includes a temperature sensor for use in a temperature control loop, for use in controlling operating temperature of the MOSFETs.

24. The device as claimed in claim 9 , wherein a number and dimensioning of the mechanical connections are selected such that electrical power loss generated in the MOSFET elements of the switches and heat output from a heater, which may be provided, are in time equilibrium with an amount of heat flowing away through the mechanical connections into the platform of the heat sink.

25. The device as claimed in claim 9, wherein the mechanical connections, provided between the base plate of the switches with the MOSFETs and the heat sink, are dimensioned with regard to the their heat dissipations, such that during operation of the device, their heat-dissipating effect is able to reach approximately 1.5 to approximately 3 times a sum of Joulian heat produced in the MOSFETs.

26. The device as claimed in claim 10, wherein the mechanical connections, provided between the base plate of the switches with the MOSFETs and the heat sink, are dimensioned with regard to the their heat dissipations, such that during operation of the device, their heat-dissipating effect is able to reach approximately 1.5 to approximately 3 times a sum of Joulian heat produced in the MOSFETs.

27. The method of claim 15, wherein current stabilization in the electromagnet is implemented by regulating frequency of the pulses of the feed to the transformer of the flux pump.

28. The method of claim 15, wherein current stabilization in the electromagnet is implemented by regulating primary-side current amplitude of the transformer of the flux pump.

29. A superconductor flux pump, comprising:

a transformer, the transformer including, on a secondary side, at least one superconducting coil in a rectifier circuit and at least two controllable switches, the pump being provided to feed current into a superconducting coil of an electromagnet, wherein the respective secondary-side coil includes HT_c superconductor material and wherein MOSFETs are provided as the at least two controllable switches in the secondary-side rectifier circuit.

30. The pump as claimed in claim 29, wherein, for a respective individual switch, a plurality of MOSFETs are electrically connected in parallel with one another.

31. The pump as claimed in claim 29, wherein, for a respective individual switch, a plurality of MOSFETs are electrically connected in parallel with one another.

32. The pump as claimed in claim 29, wherein the MOSFETs are selected, with respect to their electrical forward resistance at a relatively low operating temperature, such that MOSFETs with a relatively low forward resistance are provided in the rectifier circuit.

33. The pump as claimed in claim 29, wherein the MOSFETs are arranged on a base plate of a relatively highly thermally conducting material.

34. The pump as claimed in claim 33, wherein the base plate includes an electric heater to control temperature of the base plate.

35. The pump as claimed in claim 33, wherein the base plate includes a temperature sensor for use in a temperature control loop, for use in controlling operating temperature of the MOSFETs.

36. The pump as claimed in claim 33, wherein the base plate is connected by mechanical connections with a thermally conductive property, to a heat sink.

37. The pump as claimed in claim 36, wherein the heat sink includes a platform.

38. The pump as claimed in claim 36, wherein a number and dimensioning of the mechanical connections are selected such that electrical power loss generated in the MOSFET elements of the switches and heat output from a heater, which may be provided, are in time equilibrium with an amount of heat flowing away through the mechanical connections into the platform of the heat sink.

39. The pump as claimed in claim 36, wherein the mechanical connections, provided between the base plate of the switches with the MOSFETs and the heat sink, are dimensioned with regard to the their heat dissipations, such that during operation of the device, their heat-dissipating effect is able to reach approximately 1.5 to approximately 3 times a sum of Joulian heat produced in the MOSFETs.

40. The pump as claimed in claim 29, wherein the transformer includes a ferrite core.

41. The pump as claimed in claim 29, wherein the transformer includes no core.